

Building retrofit

Renovation of St. Cyril and Methodius school



Purchasing body:	Gabrovo Municipality
Contract:	Full rehabilitaion of St. Cyril and Methodius school Published on 06.04.2017 Awarded on 04.09.2017 to <i>Nov standart 2012 Ltd.</i>
Savings:	<ul style="list-style-type: none"> • 155.3 tons of CO₂ emissions saved (92 t compared to a conventional solution) • Primary energy savings – 0.7 GWh (0.4 GWh/yr compared to a conventional solution) • Financial Savings - 25,564 EUR

SUMMARY

- Retrofitting of the building and construction works in the playgrounds
- Market engagement with suppliers to explore innovative measures
- Performance/Output Based Specification for minimum energy efficiency - class B (according to Bulgarian legislation)
- First tender in Bulgaria to specify achievement of a minimum energy class
- Design and construction works in one contract
- Tender will result in more energy efficient building and a healthier environment for school children

Procurement Approach

Gabrovo Municipality had been trying to renovate the St. Cyril and Methodius school for more than 5 years. The municipality faced a number of challenges in their ambition to renovate the building to a much higher energy efficiency standard. The main reason was the lack of capacity of the designers as well as the uncertainty and lack of experience of the municipal experts in deep renovation projects. The tender approach aimed to address this problem. The project is 100% financed under the Operational Programme for Regional Development, supported by the Bulgarian Ministry of Regional Development and Public Works.

The building of St. Cyril and Methodius school in Gabrovo was constructed in 1970. It has a concrete structure with external brick walls (25cm) and a concrete flat double ventilated roof. The building consists of four blocks (one administrative; –two containing classrooms; –and one sports facility). The heating is sourced from natural gas boilers and the building contains no cooling and ventilation systems.

According to the Programme guidelines, the energy efficiency measures should be in accordance with the recommendations of an energy audit. Every public building in Bulgaria is obliged to have such audit, which is carried out by a certified consultant. The building is currently class D. During the development of the energy audit, numerous individual and packs of efficiency measures were evaluated technically and financially with the active participation of municipal and EcoEnergy experts. Comparison between different combinations of measures leading to energy classes A, B and C were performed (reaching a minimum of class C is mandatory). The main concerns of all experts were based on the lack of experience in Bulgaria for deep renovation and implementation of mechanical ventilation in existing buildings.

The tender is for both design and construction. Such an approach allows the bidder to search for and propose different solutions in order to respond to the requirements of the municipality, which is to reach energy efficiency class B (in accordance with the Bulgarian legislation). For comparison, the current National Program for Energy Efficiency in Multifamily Buildings requires class C.

Market Engagement

Numerous informal meetings between the energy auditors, municipal and EcoEnergy experts took place. As part of the research into what was possible for the procurement, two companies participated in one of the Bulgarian SPP network meetings, clarifying the benefits of building automation. In addition, individual meetings with four different companies involved in building automation systems were held during the development of the tender specifications.

PROCUREMENT INNOVATION

The requirement to reach a higher energy standard during renovation of existing buildings was an innovative approach. The requirements for air quality in the classrooms and automation system within schools retrofitting projects were also never applied in Bulgaria.

The usual approach in Bulgaria is to reach the minimum requirements with the lowest price.

Based on the market dialogue, innovative measures for Bulgaria were considered possible, i.e. applying the European Standard EN 15232 (Energy performance of buildings - Impact of Building Automation, Controls and Building Management); limiting the water flow of the taps; implementing mechanical ventilation with high efficient recuperation in the sports halls and the kitchen.

As a direct outcome of the contacts initiated during the development of this specific tender, Gabrovo submitted a project proposal under Environmental Innovation Program of the Federal Ministry for the Environment, Nature Conservation, Construction and Nuclear Safety of Germany. The project considers implementation of Building management system in eight kindergartens within the municipality and if approved and implemented will be the first of its kind for Bulgaria.

Performance Output Based Specifications (POBS)

Based on the [Best Practice Report for Performance / Output Based Specifications](#) (POBS), developed under the SPP Project, the following characteristics of this approach can be found in this tender:

- Outputs are aimed at satisfying a functional need in terms of quality, quantity, and reliability
- The technical specifications define the desired result, which outputs will be measured, and how they will be measured
- Emphasis is placed on what is to be performed rather than how to perform it. The bidding documents do not normally prescribe the inputs or a work method for the contractor, thus leaving the contractor free to propose the most appropriate solution, based on mature and well proven experience. However the contractor would have to demonstrate that the level of quality specified in the bidding documents will be achieved

The requirement to achieve minimum energy efficiency class B is not only for construction works but for both design and construction. Such approach is innovative in Bulgaria, with this being the first occasion in a tender for renovation of public buildings. The energy audit and tender technical specifications give some strict requirements considering the U-values (heat transfer coefficients) of the building envelope, but in general the contractor has the freedom to decide how to reach the expected results.

Tender specifications and Verification

TECHNICAL SPECIFICATIONS

- Energy efficiency class after retrofitting - class B
- Class B in accordance with [EN 15232](#)
- Max. water flow through taps - 5 l/min
- Warranty periods for the insulation, HVAC (Heating, Ventilation and Air Conditioning) systems, windows (5 years standard and additional points in case of 10 years)
- Measures to reduce the difficulties for pupils, staff and residents during the construction works

AWARD CRITERIA

- Price - max. 30 points
- Technical proposal - max. 70 points

A regional approach to SPP

As the first in Bulgaria to require achievement of a minimum energy class, but not the exact recommendations of the energy audit, this tender has been widely spread and discussed with the municipal experts within the Bulgarian SPP network. The approach raised the interest of the experts and hopefully will be used by other network partners, which should lead to an improvement in future tenders. The results of this process will demonstrate that reaching higher energy efficiency levels is affordable for public authorities. Based on the outcomes, the requirement for minimum class C in building retrofitting (as in the current Bulgarian legislation) will be soon overcome and local authorities will target achievement of more ambitious energy classes, a goal set up by the network partners.

Results

Environmental impacts

Two approaches were used to calculate the environmental impact of the tender. The results in Table 1 show comparison of the green tender against the actual consumption of the building before the project implementation, as well as with the energy consumption if the legislative minimum requirements of Class C were fulfilled.

The following innovative measures, which are usually not included in projects for rehabilitation of schools in Bulgaria, were suggested by the winning participant:

- Shading of the Sought windows, achieving a minimum of 55% reduction of solar radiation
- Individual room control heating
- Energy management system
- Tap water will be limited not only by flow but also by temperature to avoid overheating and further reduce energy consumption

All these measures will be discussed and specified in details during the development of the technical design.

Table 1: Environmental savings green tender compared to benchmark and conventional solutions

Tender	Consumption (kWh/year) (Nm ³ /yr)	CO ₂ emissions (tCO ₂ /year)	Primary Energy consumption (GWh/year)	RES triggered (GWh/yr)
Benchmark (electricity and natural gas)	65,367 kWh 86,607 Nm ³	270.3	1.13	0
Minimum requirement (electricity and natural gas)	65,367 kWh 61,341 Nm ³	207.1	0.85	0
Green tender (electricity and natural gas)	42,412 kWh 32,084 Nm ³	115.0	0.46	0.005
Savings between green tender compared to benchmark		155.3	0.67	0.005
Savings between green tender compared to minimum requirement		92.0	0.38	0.005

CALCULATION BASIS

- CO₂ emissions factor for electricity: 0.819 kg/kWh
- CO₂ emissions factor for natural gas: 2.503 kg/Nm³
- Primary energy factor for electricity: 2.5
- Primary energy factor for natural gas: 1.1
- Primary energy consumption for the minimum required class C: 115 kWh/m²/yr
- *The calculation has been conducted using the tool developed in the GPP 2020 project (www.gpp2020.eu), and adjusted in the SPP Regions project (www.sppregions.eu). The detailed calculations can be found in Annex 1 of the present document.*

Financial and social impacts

The significant decrease of the price of natural gas in Bulgaria in the last few years (according to EUROSTAT data, in 2016 the price of the natural gas in Bulgaria is the lowest in EU), reflects less

favourably on the financial impact of the project. The expected annual savings are in the amount of 25,564 EUR. However, the price of the natural gas is expected to grow in the next years and that will result in higher savings in the future.

The requirements for mechanical ventilation in some of the premises, as well as control of the levels of CO₂, will guarantee the healthy environment for the students. It is well known that high levels of CO₂ in classrooms lead to drowsiness, eye irritation, and inability to concentrate. Unfortunately in Bulgaria, mechanical ventilation in kindergartens and classrooms is not used. It is hoped that this first tender implementing such measures will be followed by more municipalities in the future.

Market response

Four bidders submitted their proposals. One of them was disqualified due to non-observance of the minimum requirements (missing certificates of the proposed products). Technical and financial evaluation was carried out on the other three proposals. Based on the evaluation methodology, the main focus of the commission, involving municipal experts, was on the quality of the construction works with 70% of the total possible points. Price accounted for 30% of the total score. Two of the proposals were rated with the maximum of 70 points for the technical part of the proposal, as they offered the maximum warranties for the new measures and proposed adequate plans for not interrupting the educational processes in the school. Of these two proposals, the one with the lower price was awarded the contract.

Lessons learned and future challenges

Based on the tender outcomes the following conclusions can be made:

- Reaching higher energy standards in retrofitting of old public buildings is not "mission impossible" for the public authorities.
- Requiring improved air quality in schools and kindergartens is possible and must be part of future tenders, clearly demonstrating the care of the local authorities for the children.
- Using POBS and uniting design and construction works in one tender allows the contractor to improvise and suggest the best possible solutions. All these solutions were discussed with the municipal experts after the signing of the contract.
- Involving external experts and potential bidders during the development of the tender documents can ensure that new and up-to-date technologies will be used during the implementation of the project.

Considering this tender as a pilot one, implementing criteria (min. efficiency class, building automation in renovation of public buildings, tap water limits, indoor air quality) and approaches (market engagement, POBS) that have not been used in Bulgaria, it is quite clear that eco-innovative tenders can be approved in the future.

Delay of the final payment in accordance with the achieving the specified results is not possible, as the financing institution (the Bulgarian Ministry of Regional Development and Public Works) requires all payments to be made in order to provide the subsidy. In future for a POBS approach, it would be recommended to withhold a certain amount for guarantee of performance, when the results are achieved in accordance with the project proposal.

Although better than the common practice, the required energy efficiency class B is a limitation to the bidders in case they want to propose a higher energy class. In future, additional points should be granted to the bidders proposing Class A or even [Nearly Zero-Energy Buildings](#) (NZEB) standard.

At this stage, mechanical ventilation with recuperation will be implemented in the sports halls and the kitchen premises. The required levels of CO₂ in the classrooms will be provided by automatic flaps in the window frames. In future bids and if technically possible, high efficient mechanical ventilation may be implemented in classrooms, significantly decreasing the heat losses from infiltration.

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Annex 1 - Calculation of environmental savings (if relevant)

Calculations made using the tool developed within the GPP 2020 project (www.gpp2020.eu), and refined within the SPP Regions project. Available on the SPP Regions website.

INPUT DATA						
Energy source	Baseline		Conventional tender		Green tender	
	Current annual energy consumption		Expected annual energy consumption		Expected annual energy consumption	
Electricity, conventional	65 367	kWh	65 367	kWh	42 412	kWh
Electricity, green		kWh		kWh		kWh
Heating oil		l		l		l
Natural Gas	86 607	m ³	61 341	m ³	32 084	m ³
Wood pellets		kg		kg		kg
Wood		kg		kg		kg
District heating		kWh		kWh		kWh
Coal Briquette		kg		kg		kg
Lignite high quality		kg		kg		kg
Lignite low quality		kg		kg		kg
Coke/Anthracite		kg		kg		kg

SAVINGS						
Expected results	Savings (Baseline / Green tender)			Savings (Conventional / Green)		
	Per year	Per lifetime	Percentage	Per year	Per lifetime	Percentage
Primary energy savings, (GWh)	0,7	16,6	58,93%	0,4	9,6	45,27%
Reduction of CO ₂ emissions, (t CO ₂)	155,3	3 881,8	57,44%	92,0	2 300,8	44,44%

About SPP Regions

SPP Regions is promoting the creation and expansion of 7 European regional networks of municipalities working together on sustainable public procurement (SPP) and public procurement of innovation (PPI).

The regional networks are collaborating directly on tendering for eco-innovative solutions, whilst building capacities and transferring skills and knowledge through their SPP and PPI activities. The 42 tenders within the project will achieve 54.3 GWh/year primary energy savings and trigger 45 GWh/year renewable energy.

SPP REGIONS PARTNERS



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